
10. ENGINEERING

In accordance with CEC regulations, this section and its related appendices and Sections 2, 5, 6, and 7 present information concerning the design and engineering of the Silicon Valley Power Pico Power Project (PPP). Section 10.1 describes the design of these project facilities with reference to Section 2, the Project Description. Section 10.2 discusses the reliability of the PPP, and Section 10.3 presents the estimated thermal efficiency of the facility. Section 10.4 describes the LORS applicable to the PPP engineering, and Section 10.5 identifies agencies that have jurisdiction, and provides the contact persons within those agencies.

10.1 FACILITY DESIGN

Detailed descriptions of the PPP are provided in Sections 2.2, and 2.3 respectively. Design for safety is provided in Section 2.2.17, Facility Safety Design.

A preliminary geotechnical assessment of the proposed site, including soil borings, has been completed. A copy of the Geotechnical Report is included in Appendix 10G of this AFC.

Summary descriptions of the design criteria are included in: Appendix 10-A, Civil Engineering Design Criteria; Appendix 10-B, Structural Engineering Design Criteria; Appendix 10-C, Mechanical Engineering Design Criteria; Appendix 10-D, Electrical Engineering Design Criteria; Appendix 10-E, Control Engineering Design Criteria; and Appendix 10-F, Chemical Engineering Design Criteria.

Design and engineering information and data for the following systems are found in the following parts of the AFC:

- **Power Generation**—See Section 2.2.4 regarding the CTG, HRSG, and STG. Also see Appendix 10-C and Sections 2.2.5 through 2.2.13, which describe the various plant auxiliaries.
- **Heat Dissipation**—See Section 2.2.8, Plant Cooling Systems, and Appendix 10-C.
- **Cooling Water Supply System**—See Section 2.2.7, Water Supply, Section 2.2.8, Plant Cooling System, and Appendix 10-F.
- **Air Emission Control System**—See Section 2.2.11 Emission Control and Monitoring, and Section 8.1, Air Quality.
- **Waste Disposal System**—See Section 2.2.9 and 8.14, Waste Management.
- **Noise Abatement System**—See Section 8.7, Noise, and Appendix 10-C.
- **Switchyards/Transformer Systems**—See Section 2.2.5, Major Electrical Equipment and Systems; 2.2.13.2, Grounding; Section 2.2.5.1, AC Power-Transmission; Section 2.2.14, Interconnect to Transmission Line; Section 6, Electrical Transmission; and Appendix 10-D, Electrical Engineering Design Criteria.

10.2 RELIABILITY

This section discusses the availability of fuel, the expected service life of the plant, and the degree of reliability to be achieved by the PPP.

10.2.1 Fuel Availability

The new dedicated gas supply pipeline to the PPP will be connected to PG&E's line 132, about 1.7 miles north of the PPP site. Line 132 is capable of delivering the required quantity of gas to the PPP. It is conceivable that PG&E's transmission line or the new branch pipeline from the Line 132 to the PPP could become temporarily inoperable if there is a breach in one of the lines or from other causes, resulting in fuel being unavailable at the PPP. The PPP facility has no backup fuel supply and would, therefore, have to be shut down until the situation was corrected.

10.2.2 Plant Availability

The PPP will be a Utility-owned dispatchable facility. Due to the relatively high combined-cycle efficiency of the PPP, it is anticipated that the facility will normally operate at a high average annual capacity consistent with electric power market conditions. The PPP will be designed for an operating life of 30 years. Reliability and availability projections are based on this operating life. O&M procedures will be consistent with industry standard practices to maintain the useful life status of plant components.

The PPP combined-cycle power block will consist of two natural gas-fired CTGs, two HRSGs with natural gas-fired duct burners, and one STG. The combined-cycle power block is projected to operate between 30 and 100 percent of each year during each of the 30 years. The percentage of time that the combined-cycle power block is projected to operate is defined as the "service factor." The service factor considers the amount of time that a unit is operating and generating power, whether at full or partial load. The PPP will be permitted to operate for a total of 8,508 hours each year, consisting of 7,108 hours at base load and 1,400 hours of peak firing with the duct burner, but will be dispatched based on economic need.

There are no known geologic hazards other than the possibility of a major earthquake (see Section 8.4, Geological Hazards and Resources).

The PPP will be designed to ensure high reliability, including the redundancy of critical components (see Section 2.2.18.2, Redundancy of Critical Components).

Deterioration of output capacity and efficiency of the PPP over time, called maturation, is expected to be on the order of 2 to 3 percent over a 3-year period. Cleaning, maintenance, or overhaul will recapture most of the loss. Over the expected 30-year life of the facility, the estimated total, nonrecovered loss in output and efficiency will be on the order of 1 to 2 percent.

10.3 EFFICIENCY

The maximum thermal efficiency that can be expected from the natural gas-fired combined-cycle plant is approximately 45 percent (higher heating value basis). This level of efficiency is achieved when a facility is base-loaded. Other types of operations, particularly those at less than full gas turbine output, or when the duct burner is in use, will result in lower efficiencies. Potential operating scenarios for the plant vary virtually continuous base-load operation during its early life to a very low facility capacity factor near the end of its operating life as new technologies displace today's best. The number of plant startup and shutdown cycles is expected to range between zero and over 252 per year per CTG.

The maximum annual generation possible from the facility is estimated to be between 1,046 and 1,080 gigawatt hours (GWh). The amount of power generated during plant startups and shutdowns can also only be estimated roughly. The range of startup/shutdown generation possible begins near zero megawatt hours (MWh) per year and increases to a maximum of 1,080 GWh per year.

10.4 LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

The LORS that are applicable to the design of the PPP are referenced in Table 10.4-1 below. LORS applicable to the environmental areas of the AFC (sections 8.1 through 8.16) are contained within each of the environmental sections. The project will conform to all of these LORS.

Table 10.4-1. Applicable laws, ordinances, regulations, and standards.

LORS	Location in AFC for Facility Design Compliance	Conformance
Federal:		
Occupational Safety and Health Act (OSHA)—29CFR1910 and 29CFR126	Section 10	Meet Requirements
Environmental Protection Agency (EPA)—40CFR60, 40CFR75, 40CFR112, 40CFR302, 40CFR423, 40CFR50, 40CFR100, 40CFR260, 40CFR300, and 40CFR400	Section 8 & 10	Meet Requirements
Federal Aviation Administration (FAA)—Obstruction Marking and Lighting AC No. 70/74601H	Section 6 & 10	Meet Requirements
California:		
California Code of Regulations (CCR)— Title 8, Sections 450 and 750 and Title 24, 1995, Titles 14, 17, 19, 20, 22, 23, and 26.	Section 10	Meet Requirements
California Department of Transportation (Cal-DOT)—Standard Specifications	Section 10	Meet Requirements
California Occupational Safety and Health Administration (Cal-OSHA)—Regulations and Standards	Section 10	Meet Requirement
California Business and Professions Code—Sections 6704, 5730, and 6736	Section 10	Meet Requirements
California Vehicle Code—Section 35780	Section 10	Meet Requirements
California Labor Code—Section 6500	Section 10	Meet Requirements
Local:		
City of Santa Clara—Regulations and Ordinances	Section 10	Meet Requirements
County of Santa Clara—Regulations and Ordinances	Section 10	Meet Requirements
Industrial:		
Civil Engineering Design Criteria	Appendix 10-A	Meet Design Criteria
Structural Engineering Design Criteria	Appendix 10-B	Meet Design Criteria
Mechanical Engineering Design Criteria	Appendix 10-C	Meet Design Criteria
Control Engineering Design Criteria	Appendix 10-E	Meet Design Criteria
Chemical Engineering Design Criteria	Appendix 10-F	Meet Design Criteria
Geologic and Foundation Design Criteria	Appendix 10-G	Meet Design Criteria

The Appendices to Chapter 10 contain the discipline design criteria that will be used in design. Appendix 10-A and Appendix 10-B address the physical design criteria for the site-related features, structures, and foundations of the PPP.

Appendices 10-C through 10-F provide the design criteria for the PPP system and equipment, including the codes and standards that apply to the design, materials, fabrication and erection of the system and equipment. The project will also comply fully with these codes and standards.

Appendix 10-G, Geologic and Foundation Criteria, is provided as the project geotechnical report, which covers the subsurface investigation, laboratory testing program, and preliminary geotechnical assessment of the PPP. The preliminary foundation design considerations and criteria are provided for the PPP structures in Appendix 10-G geotechnical report.

10.5 INVOLVED AGENCIES AND AGENCY CONTACTS

Building Permits for the PPP would be issued by the Santa Clara Department of Planning and Inspection. A point of contact is provided in Table 10.4-2.

Table 10.4-2. Agency Contacts

Agency	Contact	Telephone
City of Santa Clara Department of Planning and Inspection	Geoffrey Goodfellow Director of Planning and Inspection	(408) 615-2450

10.6 PERMITS AND PERMITTING SCHEDULE

A detailed schedule for submittal of all plans and specifications that require review by the Chief Building Official (CBO) will be prepared well in advance of the start of construction of the PPP.